

AMENDMENTS TO THE CLAIMS

Please amend the claims of the present application as set forth below.

- In accordance with the PTO's revised amendment format, a detailed listing of all claims has been provided. A status Identifier is provided for each claim
- 5 in a parenthetical expression following each claim number. Changes to the claims are shown by strikethrough (for deleted matter) or underlining (for added matter).

Claims 1, 2, 4-7, 10-12, 14-16, 18, 19, and 27-31 were pending.

- 10 No claims are canceled.

Claims 32-47 are added.

Claims 1, 11, and 27 are amended without prejudice.

Accordingly, following entry of these amendments, claims 1, 2, 4-7, 10-12, 14-16, 18, 19, and 27-47 are pending.

- 15

47
-13
34

(35)

1. (Presently Amended) A rotating data storage disk system comprising:

a plurality of concentric tracks defined on a disk;

C₁
said disk including at least two data storage areas, wherein each area
5 is sized to store a copy of a set of data and the data storage areas are
substantially equidistantly spaced from each other and wherein all of the at
least two data storage areas are located within plus or minus one track of the
same track;

a drive mechanism coupled to the disk; and

10 a remote controller in communication with the drive mechanism for
maintaining data coherency between the at least two data storage areas and
keeping track of deferred writes to the at least two data storage areas of the
disk.

2. (Original) The rotating data storage disk of claim 1 wherein the at
15 least two data storage areas are located at radially opposed locations at a
substantially 180 degree angular offset with respect to a spin axis of the
rotating data storage disk and mirrored across the spin axis.

3. (Canceled)

4. (Original) The rotating data storage disk of claim 1 wherein the disk
20 further comprises at least two magnetic recording surfaces, wherein the data

storage areas are formed in a single one of the at least two magnetic recording surfaces.

5. (Original) The rotating data storage disk of claim 1 wherein the disk further comprises at least two magnetic recording surfaces, wherein the data
5 storage areas are formed in separate ones of the at least two magnetic recording surfaces.

C1
6. (Original) The rotating data storage disk of claim 1 wherein the disk further comprises an optical recording surface.

7. (Original) The rotating data storage disk of claim 1 wherein the disk
10 further comprises a magneto-optical recording surface.

8. (Canceled)

9. (Canceled)

10. (Previously Presented) The rotating data storage disk of claim 1 wherein the at least two data storage areas comprise "n" storage areas and
15 the disk exhibits a characteristic virtual revolutions per minute (RPM) that is a multiple n of the actual spin speed of the rotating data storage disk.

11. (Presently Amended) A disk drive system comprising:

one or more platters, each platter supporting at least one recording surface, wherein the platters are aligned about a common central axis;

a plurality of concentric tracks defined on the platter;

5 means for spinning the platters about the common central axis;

a recording head associated with each recording surface;

an actuator mechanism coupled to each recording head to move the recording head into proximity with selected portions of the recording surface in response to received commands; and

10 at least two replicates of data stored in at least two data storage areas such that any one of the at least two replicates can be accessed to service a data access request and all of the at least two data storage areas are located within plus or minus one track of the same track; and

a remote controller for maintaining data coherency between the at
15 least two data storage areas and keeping track of deferred writes to the data storage areas.

12. (Previously Presented) The disk drive system of claim 11 wherein the data storage areas are located so as to be mirrored about a spin axis of the platters.

20 13. (Canceled)

Lee & Hayes, PLLC

7

HP1-788US
200302135-1

1/27/2004

14. (Original) The disk drive system of claim 11 wherein the data storage areas are formed in a single one of the one or more platters.

15. (Original) The disk drive system of claim 11 wherein the data storage areas are formed in separate platters of the one or more platters.

C₁
5 16. (Previously Presented) The disk drive system of claim 11 wherein each recording surface further comprises a plurality of concentric tracks defined on the recording surface and each track is substantially aligned with a corresponding track on an adjacent platter, wherein all of the at least two data storage areas are located on adjacent tracks.

10 17. (Canceled)

18. (Previously Presented) The disk drive system of claim 11 wherein the at least two data storage areas comprise "n" storage areas and the disk exhibits a characteristic virtual revolutions per minute (RPM) that is a multiple n of the actual spin speed of the rotating data storage platter.

19. (Previously Presented) The disk drive system of claim 11 further comprising:

a command processor having an interface to receive external disk access requests and coupled to provide the disk access request to the

5 actuator mechanism; and

C1 memory coupled to the command processor and configured to store redundant write access request commands such that the at least two replicates can be stored asynchronously.

20. (Canceled)

10 21. (Canceled)

22. (Canceled)

23. (Canceled)

24. (Canceled)

25. (Canceled)

15 26. (Canceled)

27. (Presently Amended) A disk controller in communication with a disk comprising:

a command port for receiving disk access commands;

a command processor for executing software processes;

5 a first process executing in the command processor for replicating a received ~~disk-access~~ write request, wherein the first process generates a replicated ~~access~~ write request that refers to a disk track adjacent to a disk track referred to by the ~~access~~ received write request;

C1
a second process executing in the command processor for executing
10 at least one of the received ~~disk-access~~ write request and replicated ~~disk access~~ write request against a disk drive; and

means for maintaining data coherency between a first data storage area affected by a received write request and a second data storage area affected by a replicated write request and keeping track of deferred writes to
15 the disk.

28. (Original) The disk controller of claim 27 wherein the first process comprises processes configured to cause the command processor to determine radially opposed locations within the disk suitable for the disk access request.

20 29. (Original) The disk controller of claim 27 wherein the first process comprises processes configured to cause the command processor to

determine locations on adjacent tracks within the disk suitable for the disk
access request.

30. (Previously Presented) The disk controller of claim 28 wherein the
second process receives the determined radially opposed locations and
5 executes the at least one disk access request at the determined location.

C1
31. (Original) The disk controller of claim 27 further comprising a
redundant data table holding one or more pending write access requests
and coupled to the second process such that the second process can
execute the received disk access request and the replicated disk access
10 request asynchronously.

32. (New) The disk drive system of claim 1, further comprising an
integrated controller that manages data storage operations of the disk drive
system.

33. (New) The disk drive system of claim 32, wherein:
15 the integrated controller maintains a first redundant data table in
volatile memory, wherein the first redundant data table comprises
information about one or more deferred write commands;

the remote controller maintains a second redundant data table in non-
volatile memory, wherein the second redundant data table comprises
20 information about one or more deferred write commands.

34. (New) The disk drive system of claim 33, wherein:

the integrated controller uses the information in the first redundant data table to perform a deferred write operation to one or more of the at least two data storage areas.

35. (New) The disk drive system of claim 34 wherein, upon completion of
5 the deferred write operation, the integrated controller:

removes an entry corresponding to the deferred write operation from the first redundant data table; and

transmits a notification to the remote controller indicating completion of the deferred write operation.

- 10 36. (New) The disk drive system of claim 35 wherein, upon receipt of the notification, the remote controller removes an entry corresponding to the deferred write operation from the second redundant data table.

37. (New) The disk drive system of claim 33, wherein:

15 in response to a read request from a host computer, the remote controller uses the second redundant data table to determine whether the read request references data on the disk drive that is coherent.

38. (New) The disk drive system of claim 37 wherein the remote controller issues a SCSI read command if the read request references coherent data.

39. (New) The disk drive system of claim 37, wherein the remote
20 controller issues a modified read command if the read request references

data that is not coherent, wherein the modified read command specifies a location on the disk drive from which to read the referenced data.

40. (New) The disk drive system of claim 11, further comprising an integrated controller that manages data storage operations of the disk drive system.

41. (New) The disk drive system of claim 40, wherein:

the integrated controller maintains a first redundant data table in volatile memory, wherein the first redundant data table comprises information about one or more deferred write commands;

- 10 the remote controller maintains a second redundant data table in non-volatile memory, wherein the second redundant data table comprises information about one or more deferred write commands.

42. (New) The disk drive system of claim 41, wherein:

- 15 the integrated controller uses the information in the first redundant data table to perform a deferred write operation to one or more of the at least two data storage areas.

43. (New) The disk drive system of claim 42 wherein, upon completion of the deferred write operation, the integrated controller:

- 20 removes an entry corresponding to the deferred write operation from the first redundant data table; and

transmits a notification to the remote controller indicating completion of the deferred write operation.

44. (New) The disk drive system of claim 43 wherein, upon receipt of the notification, the remote controller removes an entry corresponding to the deferred write operation from the second redundant data table.

45. (New) The disk drive system of claim 41, wherein:

in response to a read request from a host computer, the remote controller uses the second redundant data table to determine whether the read request references data on the disk drive that is coherent.

46. (New) The disk drive system of claim 45 wherein the remote controller issues a SCSI read command if the read request references coherent data.

47. (New) The disk drive system of claim 45, wherein the remote controller issues a modified read command if the read request references data that is not coherent, wherein the modified read command specifies a location on the disk drive from which to read the requested data.

REMARKS

In view of the following remarks, Applicant respectfully requests reconsideration and allowance of the subject application. This amendment is believed to be fully responsive to all issues raised in the Office Action mailed December 5, 2003.

Claim Rejections

Lee & Hayes, PLLC

14

HP1-786US
200302135-1

1/27/2004